

SCIENCE

VOL. 76

FRIDAY, JULY 8, 1932.

No. 1958

Dedication of the Hall of Science of the Century of Progress Exposition:

Introductory Addresses: RUFUS C. DAWES, DR. HENRY CREW

21

The Social Effect of Modern Science: DR. F. B. JEWETT

23

Obituary:

Leonard Thompson Troland: DR. A. A. ROBACK.
Recent Deaths

26

Scientific Events:

The International Geological Congress; The Twelfth Biennial Conclave of Alpha Chi Sigma; The Fifth Greenland Expedition of the University of Michigan; Awards of the Royal Geographical Society; Appointments and Promotions at the Rockefeller Institute for Medical Research

28

Scientific Notes and News

30

Discussion:

The Ouachita Project: ROBERT STERLING YARD.
A New Meteorite from the Black Hills: DR. CLEOPHAS C. O'HARRA. *Infection of the Cloaca with the Virus of Infectious Bronchitis:* C. B. HUDSON and F. R. BEAUDETTE. *Zoological Nomenclature:* DR. C. W. STILES

33

Scientific Books:

Ambronn's Elements of Geophysics as Applied to Explorations for Minerals, Oils and Gas: WALTER D. LAMBERT

35

Scientific Apparatus and Laboratory Methods:

Corrugated Rubber Tambour Diaphragms: PROFESSOR RAYMOND DODGE and F. H. J. NEWTON. *A Method for the Determination of the Velocity of Sound in Solids:* PROFESSOR WILLIAM T. RICHARDS

36

Special Articles:

Sexual Variations in the Pelvis: DR. W. E. CALDWELL and DR. H. C. MOLOY

37

Science News

8

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. McKEEN CATTELL and published every Friday by

THE SCIENCE PRESS

New York City: Grand Central Terminal
Lancaster, Pa. Garrison, N. Y.

Annual Subscription, \$6.00 Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary, in the Smithsonian Institution Building, Washington, D. C.

DEDICATION OF THE HALL OF SCIENCE OF THE CENTURY OF PROGRESS EXPOSITION¹

INTRODUCTORY ADDRESSES

By RUFUS C. DAWES

PRESIDENT OF THE EXPOSITION

IT was in August, 1928, nearly four years ago, that A Century of Progress, having completed its organization and outlined the general theme for its exposition, addressed a letter to Dr. George K. Burgess, then chairman of the National Research Council, containing the following sentences:

This association is desirous of providing a celebration of such character and magnitude as to be a worthy expression of the people's pride, a fitting acknowledgment of the services of our predecessors, and a source of education and inspiration, as well as entertainment, for our visitors. In all these things we are trying to proceed with a national and not a local vision.

We desire to present as a central theme of our exposition, the progress of civilization during the one hundred years of Chicago's existence. This seems to us

especially appropriate because this period represents also the great period of development of the physical sciences and their application to the services of man. We feel that a new value can be given to the enterprise by making its central idea an exposition of the service of science to society, and of the benefit to humanity brought about by this scientific and industrial development.

In broad lines we vision a great Hall of Science within which in a systematic manner the history of science, the logical development of the special sciences and their applications may be disclosed.

To-day we realize this vision and are met to dedicate the Hall of Science which in imposing proportions is the realization of our dream. We have adhered rigidly to the plan announced and the genius of the architect, Paul Cret, has afforded us a fitting setting for the dramatization of our basic theme. The hall of Science encloses nine acres of ground and offers on its two floors nine acres of exhibition space.

¹ Chicago, June 1, 1932

The public must judge as to its beauty, its availability to the purposes for which it was built and its adjustment to modern conditions. We offer it for their judgment with confidence and pride.

Our letter, written four years ago, continues:

To carry out successfully an exposition which contains the possibilities of such dramatic interest and permanent influence requires the attention of the best minds of the nation. We feel greatly the need of assistance in formulating and announcing and developing this theme and under these circumstances we appeal to the National Research Council for advice and assistance.

We turn to the National Research Council because it has been organized under a Federal Charter for the very purpose of mobilizing the scientific intelligence of the nation; because of its intimate contact with the personnel and the institutions of science and technology; and because its past accomplishments command alike the respect and confidence of all, and give to it a unique position of trust and favor in the scientific and technical world not only in the United States but everywhere.

We desire help not only to make an adequate statement of the philosophy of our exposition but to have that statement endorsed by competent authorities. We need help in the development of this theme into a series of classifications and in the presentation of the benefits and advantages to be derived from it by the various associations of industry and other associations, and we need help in selecting the men who will be recognized as particularly competent to outline this theme in detail. We trust that the National Research Council will find it possible to help us in this matter, and that it may appoint a committee with which the officers of A Century of Progress may confer and to which the direction of this phase of our celebration can be delegated.

To-day it is our obligation to make acknowledgment to the great leaders of science whose assistance we invoked and have received. We offer our warmest appreciation for the enthusiasm expressed and the support extended by Michael Pupin and George Ellery Hale, by whose joint work the National Research Council was established and through whose influence, to a large degree, its support was extended to A Century of Progress; and to George K. Burgess, chairman of the National Research Council; and with particular gratitude to all the members of the Science Advisory Committee appointed by the National Research Council, to provide for cooperation with A Century of Progress.

Four hundred eminent scientists as members of this committee have found time in their busy lives to serve us. Not often in the history of such undertakings, I believe, have men given so much in so fine a spirit of cooperation.

The chairman of this committee was Dr. Frank B. Jewett, who honors us by his continued confidence

and who joins us as our principal speaker in the ceremonies of the dedication of this building. He will be presented to you by Dr. Henry Crew, professor of physics of the Northwestern University and chief of scientific exhibits for A Century of Progress, a man to whom we are indebted for the gift of his great reputation and abilities in organizing the exhibits to be made in this building.

By DR. HENRY CREW

PROFESSOR OF PHYSICS, NORTHWESTERN UNIVERSITY,
DIRECTOR OF THE SCIENTIFIC EXHIBITS

In the execution of any important undertaking, there are always stages at which difficulties and doubts appear; stages at which plans and policies come up for discussion and debate; but in the present enterprise, there are two features which have never, in my hearing, or to my knowledge, received adverse criticism.

One of these is the inspiring theme of the exposition; the other is the method by which this abstract theme was transformed into a concrete plan of execution. Both of these have been admirably set forth in the extracts from the letter which Dr. Dawes has just read.

Never for a moment during this brief quadrennium of our history has any one proposed to change the goal first set by that small group of clear minds in the summer of 1928; never has there been a thought of retreat from their high aim which is to demonstrate to all our visitors the ministrations of pure science to engineering and industry.

Nor has there ever been the faintest hint that a wiser and more unselfish group of men might have been found to serve in the capacity of an advisory committee.

It required no small courage for our president to ask Dr. Burgess to go before the National Research Council, which is, in a certain sense, the scientific heart of the nation, and ask it to advise and support what was then a midwest enterprise; but it took equal courage for Dr. Burgess to approach one of the guiding spirits of what is perhaps the most important and beneficent corporation in America, one of its active and responsible officers, indeed, and to invite him to give time and energy to direct a large committee in charting a course for the Century of Progress Exposition.

These courageous petitions were met by generous responses. The chief engineer of the American Telephone and Telegraph Company called to his aid, directly and indirectly, a group of several hundred of the leading American men of science. Inspired by the generous example and fine perspective of their leader

these men gave of their time, energy and experience in a manner which will not soon be forgotten.

The chairman of this advisory committee whose reports have been to us, guide, philosopher and friend, has been good enough to be with us this afternoon. To men such as he, men who conduct large affairs, men who make decisions fraught with great consequences, it is needless for me to point out that it is sometimes impossible to carry out all the details of even a well designed plan. I want to assure him and his committee, however, that the department of exhibits in this exposition has but one object in view, and that is to follow the spirit of these reports. We are here, indeed, this afternoon not only to dedicate this beautiful creation of the mind and imagination of Mr. Cret, but also to dedicate ourselves to the spirit

of this report and to the original theme of the fair.

The distinguished physicist, engineer and lovable man who will address you is no stranger to Chicago. Born and educated on the Pacific Coast in what since has become an outstanding intellectual center, he came at once to Chicago, where he added lustre to the already famous Ryerson Laboratory, presided over by the scintillating genius of Michelson. His years of service have been spent mostly on the Atlantic Coast, where fine judgment, executive ability, and a kindly attitude of mind have won him friends without number.

Ladies and gentlemen, I have the joy of introducing to you this good friend of ours, Dr. Frank B. Jewett, who will deliver the dedicatory address.

THE SOCIAL EFFECTS OF MODERN SCIENCE

By DR. F. B. JEWETT

BELL TELEPHONE LABORATORIES, AMERICAN TELEPHONE AND TELEGRAPH COMPANY

Mr. Dawes and Distinguished Guests:

In these strenuous and troublesome times most of us who are asked to speak on formal public occasions are frequently not much concerned with the subject-matter of what our speeches might be. What most concerns us is the problem of presenting reasons for declining which will be effective but which will not at the same time be likely to give undue offense. With such a condition so generally prevalent the opening remark by a speaker that he is "pleased" or "gratified" or "honored" to be present is likely to cause one's tongue to slip slyly into one's cheek.

Having thus fully apprized you that I am cognizant of the facts viewed both from the standpoint of the speaker's rostrum and from the point of view of the audience, I am now going to use all three of the words just mentioned. When I have finished with the remarks which Mr. Dawes has asked me to make I hope you will agree that this time at least I am sincere. I trust you will agree also that there is merit in the case I shall attempt to make.

I am "pleased" to be here and to take part in the ceremony of dedication of this building which a year hence is to be the Hall of Science, and so the home of the central theme exhibits of the Century of Progress. I am "gratified" that opportunity is offered a year in advance of the official opening of the exposition to set another monument still further to fix and mark the aim and object of the exposition. Finally, I feel "honored" to be asked to state again in your presence, and in the shadow of this tangible evidence of adherence to an ideal, just what it is hoped most the Century of Progress will accomplish.

The underlying plan and aim of the exposition have been stated many times by Mr. Dawes and others of the trustees and officers far more familiar than I with the details of this gigantic undertaking. None, however, have until to-day had so completely the background of a fact accomplished against which to set their words. None have been able to say that here in this completed structure are to be shown those fundamental things of science on which so much of progress during the past one hundred years is based and on whose properly continued employment so much of human happiness and well-being depend.

If I looked upon the Century of Progress as merely a grandiose exposition of the material marvels which have evolved from scientific research and its practical applications, I should not only not be here to-day, but I can assure you that I would have lost little time in thinking up plausible excuses for declining. I am very little interested in those expositions of science which have for their object mere stimulation of interest in the weird and bizarre. Further, I have very little interest in expositions or fairs or shows designed simply to provide a host of varied amusements on a lavish scale. What I am interested in particularly, at this time, is any sincere effort that can be made better to acquaint people with the possibilities and limitations of science as they enter into our common daily life.

Any intelligent thoughtful person can hardly help being impressed with the facts, first, that during this past century, which marks the corporate life of the city of Chicago, science more than any other single factor has influenced human affairs; second, that

while the material changes resulting from the common use of the things of science have been incredibly vast and in many directions of unquestioned advantage to an increased pleasure and comfort in living, the results are not wholly on one side of the ledger; and third, that despite the avidity with which we have seized upon the material things of science, and the ingenuity we have displayed in applying them for gainful purposes or to bring about an improvement or revolution in some established way of doing things, we have lagged egregiously in the development of our understanding and exercise of the social factors which these new things have introduced into human living.

Starting more than thirty years ago as a young man completely obsessed with the apparently illimitable field of opportunity offered to those who wished to make science a life work, I saw nothing very much in the social problems. In this my point of view at the time was not different from that of the vast majority of older and wiser people. In fact, I doubt whether at the time of the great Columbian Exposition in Jackson Park more than a baker's dozen or so of people in all the world had any real clear conception of what was likely to evolve. Even such wise men as did exist were probably looked upon mainly as cranks or carping critics whose warped point of view prevented their seeing the unending and easily obtained benefits which the new order was introducing.

With increasing years and a greater knowledge of what science can and can not do and, I think, a clearer picture of the forces which a wide-spread use of applied science has suddenly released at the very center of human life, my point of view has undergone a gradual progressive change.

In using the word "suddenly" as I have just done, I have employed the term advisedly. To us as individuals a hundred years is of course a long time. In the progress of man's development and in the evolution of what we are wont to call civilization it is, however, but a fleeting second. Nevertheless, in this particular fleeting second science has released forces more powerful, for good or evil, than have ever been released before in much longer periods, save possibly only those deep spiritual forces which culminated in the lives of Christ, Mahomet and Buddha.

Being almost explosive in their intensity and in their effect on society, and for the most part being of a character to intrigue the imagination of the individual, it is not surprising that our appreciation of the far-reaching social effects and of the new problems which these effects create should have been slow in coming. As a matter of fact multiple experience and the convictions arising from such experience had necessarily to precede any intelligent and successfully

constructive attempt properly to relate the new forces to the old order and the old order to the new forces.

During the past fifty years, and particularly during the past twenty-five years, knowledge both in the fields of fundamental and applied science has increased at an astounding rate. Likewise, our experiences with the effects of science applied in wholesale fashion to the common concerns of life have multiplied amazingly. Where a few decades ago only a limited number of men and women with a philosophical turn of mind saw the future dimly, now thousands of intelligent people, most of whom would disclaim being philosophers, have a fairly clear conception of what is ahead of us. True, most of them as yet realize merely that there are serious problems which must be taken in hand and solved. As to how this is to be done or what form the solutions are likely to take, they are for the most part still ignorant.

In the main this state of affairs results from uncertainty and lack of understanding on the part of the intelligent laity as to just what are the fundamental factors of science that must be taken into account. Now that the existence of a real problem is coming to be understood, intelligent education is the thing most to be desired. No one at all conversant with the facts is of course foolish enough to think that such an educational process can be accomplished in a day, or that there is any single royal road to the answer. Every powerful instrument of education—whether it be the conversation, writing or speeches of informed people, the articles and editorials of an intelligent press, the conscious endeavors of museums of science and industry like the one which is being created in Jackson Park, or the far-reaching influences of things like this forthcoming Century of Progress—is to be welcomed.

In some quarters a senseless fear of science seems to have taken hold. We hear the cry that there should be a holiday in scientific research and in the new applications of science, or that there should be a forced stoppage in the extension of old usages by mandatory legislation. To my way of thinking both points of view are as foolish as they are vain. We might by edict retard the speed with which discoveries in science are made. Possibly even some retardation might be desirable, if any one were wise enough to know just where the brakes should be applied. We might even for a time retard the spread of applications which would cheapen cost, enlarge the sphere of easy transport and communication, or add to the pleasure and comfort of living. What we can not do is to curb completely man's curiosity about the unknown, nor can we stop for long the introduction of things which men believe to be valuable additions to social life. That any one of intelligence should seek

artificially to shirk the problems presented by the things which science has introduced into our midst is tantamount to saying that the human mind which has been capable of extracting these new things out of Nature's storehouse of the unknown is incapable of adapting them to beneficent purposes.

Any attempt to stop or permanently deflect into artificial channels the widest possible employment of the things of science would be doomed to failure by the mass results of individual self-interest. This would be so even if many of the things of science did not themselves involve irresistible forces destined to bring about that wide-spread correlation of operation which we have come to designate as monopoly.

From every point of view therefore science has during the past hundred years injected into human life a multitude of factors with which our forebears did not have to deal but which we and our children and their children can not escape. The sooner we set about understanding what these factors are and dealing with them intelligently in a forward-looking rather than a reactionary manner, the better off we will be.

There is no gainsaying that in the past and at the present much that is harmful from a social or political point of view has developed out of the things of science. In the main such abuses have arisen because of the conception, implied if not specifically advanced, that the new thing was merely a better way of doing an old service and could be introduced without modifying appreciably the relation of that old service for the general welfare. In the case of entirely new kinds of service, the same general arguments were held to apply. Admission of these obvious defects of past and present results does not, however, imply that they must necessarily continue, nor does it imply that the only way out of the difficulty is to abandon completely the fundamental conceptions of private initiative, on which for centuries past we have built up our national life. What it does mean is that we must recognize and understand these new factors to the point of knowing how to weave them equitably into our social structure so that we and not the things of our creation shall be master of our destinies.

To this end real understanding of a limited number of fundamental things is all important. With such understanding attained, every bit of new scientific knowledge acquired is an addition to the strength of the social structure and not a revolutionary threat to the existing order. Nor should those of us whose lives are devoted specifically to fundamental or applied science be any less concerned than others about the proper handling of the social consequences of our work. We of all people should be most active in helping to bring about that real understanding which

seems to me so necessary. Just in measure as the public generally thoroughly understands the place and influence of scientific progress, so in that measure are we given assurance of continued support of the quest for new knowledge and new things.

Having given you now a bit of the point of view to which I have attained, I should like to connect it up with this particular occasion and with the gratification which the occasion affords me of participating in the dedication of this great building.

When some years ago I first heard that Mr. Dawes and those interested with him in devising a suitable ceremony to celebrate the one hundredth anniversary of the city of Chicago were considering the idea of a centennial exposition which would carry with it something of the lessons of the past ten decades, I was gratified by the knowledge that here in this great metropolis there was true realization of matters not appearing on the surface of an active daily life. Later on when matters took on more tangible form in discussion with the National Research Council as to whether such an exposition as the trustees had in mind could be produced, I was impressed by the deep understanding which these gentlemen had of the work which our generation has to do as its part of the problem of national development. Later on still, as chairman of the science advisory committee appointed to cooperate with the trustees in the formulation of a fundamental plan for the Century of Progress, I was confirmed in my belief and strengthened in my assurance of their sincerity and of their desire to adhere steadfastly to the aim which they thought worthy of the effort they were expending.

While unfortunately time and circumstance have intervened to modify radically some of the early conceptions of the Century of Progress as it will appear in 1933, there has never, so far as I have been able to ascertain, been any thought of deviating from the originally agreed upon basic theme for it.

No matter what curtailments and alterations of plan and desire have been forced on the trustees by the inexorable operation of the forces of a widespread economic depression, the principal aim and purpose of the exposition have been adhered to. At all times it has been recognized that it would fall far short of its objective if on the day its doors closed it had not made a substantial addition to the national understanding of the real place of science in the social structure and of those factors which have their roots in science, and which must influence the course of our social controls in the years ahead. Real education above everything else has been the goal of all who have taken part in this great adventure. This Hall of Science, the exhibits which it is to contain and the lessons and understanding which are to be

drawn from them were and still are the center of the picture. Every one who has given serious consideration to the problems involved is satisfied that the things which this building is to house can be made to convey the desired educational story and at the same time to convey it in a manner which will be strikingly interesting and widely informative.

Further than this, all are convinced that the major part of the exhibits which make up the great bulk of the exposition will in large measure be influenced by the underlying theme which typifies this building and its contents, will give point to that theme and will be enhanced in interest thereby. That much of what is presented for those of the visitors who crave only amusement or transient pleasure will have no substantial connection with the underlying theme, and that much else will have only a remote apparent connection is no derogation of the main purpose of the trustees. It is merely the result of those practical necessities which can not in the very nature of things be divorced from an undertaking of this kind.

Certainly, unless we are all completely in error as to what the Century of Progress can accomplish, every thoughtful and intelligent person who spends time within its gates will return home not only with a better understanding of the problems which confront the nation as a result of what science is bringing into the world, but likewise with a better understanding of how to go about the solution of these problems.

When a few years hence the Century of Progress is but a memory and these buildings have been razed and the grounds on which they stand have been

restored to their permanent condition, I am confident that all who have had a part in the undertaking will be satisfied that they helped to provide Chicago with a dignified and fitting centennial celebration. I am confident also that they will feel it was done in a manner calculated constructively to advance the development of our national life and to evidence the keen appreciation which the citizens of this great city have of the problems which confront the country.

It is this deep-seated belief in the educational value of the Century of Progress and in the integrity of those who are its sponsors which gives me those feelings of pleasure, gratification and honor at being permitted to take part in this prenatal ceremony of dedication. In thus closing my part of the dedicatory exercises I would not wish to leave you with the thought that full understanding and appreciation of the problems which arise out of wide-spread utilization of the things of science constitute in my mind the sole or even the major problems with which society must struggle in its slow upward course. No amount of such understanding can even remotely touch the elements of human greed, avarice and misuse of public trust which frequently bulk so large in our community life. All that I do claim is that a real understanding of the underlying forces which have been released by science will very greatly simplify the solution of many problems. These solutions, reached as a result of real understanding, must likewise tend to limit the evil effects of the human factors just mentioned which might otherwise be augmented. To me the forthcoming Century of Progress offers a unique opportunity for service.

OBITUARY

LEONARD THOMPSON TROLAND

THE tragic death of Dr. Leonard Thompson Troland removes a man from the active scientific world who will be equally missed in several fields of human endeavor. He had scarcely passed his forty-second birthday when he fell to his death on May 27 down into a rocky canyon from the summit of Mount Wilson, California, just as he was about to be photographed by an associate.

Dr. Troland, who had been suffering from a nervous collapse as a result of overwork and mental strain, had climbed the mountain for recreation. For some time he had been staying in Hollywood, where he was directing the research of the Technicolor Motion Picture Corporation, of which he was the vice-president and inventive genius.

Although still only a young man, Troland had already established a reputation not only in psychology, which was his major field, but ranked high as a

physicist through his book (with the collaboration of Dr. Daniel Comstock), "The Nature of Matter and Electricity"; was well grounded in chemistry and biology, in which branches he wrote scientific papers, receiving the Bowdoin prize for a dissertation in chemistry at Harvard; earned an enviable reputation for himself in the field of optics, and at the time of the world war was assigned to the task of developing acoustic devices for detecting approaching submarines, served as chief engineer for the Technicolor Motion Picture Corporation, in which capacity he elaborated not only the process of exhibiting colored moving pictures but developed methods to promote the manufacture of the film. In October, 1931, the U. S. Government issued to him a patent embracing 234 claims covering the production of pictures in color and acquiring rights claimed by many contestants since 1921. As if this were not a sufficient range for a single mind, he was also interested in metaphysics and ethical theory.

It is characteristic of the man that he has left provision in his will for a fund the purpose of which will be the advancement of knowledge with regard to the "relationship of consciousness and the physical world."

His was an extraordinary combination of the theoretical and the practical. The theoretical scientists respected him because of his technological achievements, while technologists admired him for his vast fund of theoretical knowledge. The only gap in his intellectual inventory was the humanistic sphere, including the esthetic and historical foundations. His practical sense reached out even into the business world, although his ambitions were never high in that direction.

Dr. Leonard Thompson Troland was born in Norwich, Connecticut, on April 26, 1889, the son of Edwin and Adelaide Elizabeth O'Brien Troland. After graduating from the Malden High School, he entered the Massachusetts Institute of Technology, receiving his degree in 1912. Continuing his studies in the Harvard Psychological Laboratory under Münsterberg, he obtained his A.M. degree in 1914 and the doctorate in 1915. He was awarded a Sheldon traveling fellowship from Harvard for 1915-16, engaging in optical research at the Nela Research Laboratory of the General Electric Company at Cleveland.

Returning to Harvard in 1916, he served for a year as fellow in psychical research, working on the problem of telepathy, the results of which turned out to be negative. From 1916 to 1922 he was instructor in psychology at Harvard University and then was promoted to assistant professor. Since 1929 he functioned as a lecturer at Harvard, directing research for the most part in vision, although he had been offered an associate professorship, provided he would devote all his time to his academic duties.

Besides numerous papers in technical periodicals, Dr. Troland was the author of "The Nature of Matter and Electricity" (in collaboration with Dr. Daniel F. Comstock), 1917; "The Present Status of Visual Science," 1922; "The Mystery of Mind," 1925; "The Fundamentals of Human Motivation," 1928; "The Principles of Psychophysiology" in four volumes, the fourth of which is now in the hands of the publishers. It is at least consoling to think that this last work, his *magnum opus*, was completed before the fatal accident. He also participated in the translation of Helmholtz's "Handbuch der physiologischen Optik" into English.

Troland was a member or fellow of about a dozen learned societies and president of the Optical Society of America in 1922-23. His marriage to Miss Florence Rogers Crockford, who survives him, took place in 1924. There was no issue.

Among the qualities which stand out in Troland's personality are his grim determination and industry, his unpretentiousness, even temper and friendliness. He could work for 12 to 15 hours at a stretch and yet was never seen hurrying. His unassuming, although by no means submissive or meek, approach was noticeable in all his contacts. Without looking for causes or individuals upon whom to lavish kindness, he was always accommodating and obliging to students as well as to associates.

In spite of the well-known popular belief about the irascibility of reddish-haired people, I never saw him display the slightest distemper but once, and that was when some one was tampering with the tools in the mechanic's shop of the psychological laboratory. In discussion, he was delightful, because he never showed the least impatience if his views were criticized, and furthermore was the first to admit difficulties. Apparently he believed with Horace that "The wise man continues unmoved."

Beneath an unruffled and phlegmatic exterior there stirred a consuming ambition. Although his practical knowledge of German was limited, he once undertook to translate one of his articles for a German periodical in his youthful naïveté that submitting a manuscript in the foreign original was a handicap to its being published. His emotionality instead of being directed against man was spent on intractable matter. To turn shapeless material into an efficient device—that is what fascinated him. His native wit was peculiar to the stock from which he was descended, *viz.*, Scotch-Irish. He could see a humorous side in almost everything; and was amused by situations at which many others would chafe. This and the fact that he never took himself too seriously are proof that he possessed a genuine sense of humor.

As a psychologist, contrary to what might have been expected of a man who was so immersed in psychophysiological research, he belonged to the traditional school. On more than one occasion he exposed the one-sidedness of behavioristic contentions. His doctrine of motivation was based on the pleasure-pain principle, which according to him was further grounded in change of conductance in the synergic field. In ethics he was a hedonist of the utilitarian type. On the metaphysical issue, he sponsored the philosophy of psychical monism, or, as he sometimes called it, paraphysical monism. His idealism, however, did not carry with it any theistic implications.

A. A. ROBACK

CAMBRIDGE, MASS.

RECENT DEATHS

DR. GEORGE K. BURGESS, director of the Bureau of Standards, died on July 2 at the age of fifty-eight years.

DR. GEORGE FREDERICK KUNZ, mineralogist, expert in gems, and vice-president of Tiffany and Company, New York, died on June 29, in his seventy-sixth year.

MISS ADELAIDE AMES, research assistant at the Harvard College Observatory, was drowned in Squam Lake, Laconia, New Hampshire, on June 27.

A CORRESPONDENT writes: "Mr. Maximo Ramos, of the Bureau of Science, Manila, died of malaria at Buayan, Cotabato Province, Mindanao, at the age of fifty years, on May 11; while engaged in field work. Mr. Ramos served as botanical collector for the Bu-

reau of Science for over thirty years, and the extensive duplicate series of his enormous collections have been distributed to botanical institutions all over the world. Few individuals in any country have prepared such extensive series of herbarium species as has Mr. Ramos."

JOHN WALTER GREGORY, professor of geology at the University of Glasgow and head of a British scientific mission studying Andean geological formations, was drowned on June 2 when his canoe capsized in the Urubamba River. Dr. Gregory was sixty-eight years old.

SCIENTIFIC EVENTS

THE INTERNATIONAL GEOLOGICAL CONGRESS

DR. W. C. MENDENHALL, director of the U. S. Geological Survey, has given a statement to a representative of the *U. S. Daily* in which he says that in spite of the uncertain means of financing the International Geological Congress, the committee on organization is formulating plans to hold a meeting next year, although it may be a small one. Since 1878, eminent geologists of the world have been assembling periodically in first one country and then another to discuss the mineral resources of the world. It has been the practice for foreign governments to recognize the congress through parliamentary action, and give official sanction and welcome to the delegates from all parts of the world.

Great Britain has been host three times, France twice, while Canada, Mexico, Sweden, Russia, Spain, Belgium and South Africa are among those which have been hosts at one or another time. It was felt by the Americans at the last session of the congress that it was time for this country to be host; hence a proposal to hold the congress here was made.

Because of the economic situation the congress was deferred one year, and the tentative date is now set for the summer of 1933. A bill before congress calling for \$85,000 to cover the costs has been killed; hence official aid can hardly be expected now.

The meeting of world geologists from time to time is concerned with industry and international understanding on world mineral resources. Such resources as coal, gold and similar commodities of international importance have been discussed, and the potential wealth of the world in respect to their future use has been set forth in papers which are the final word on the subject.

At the last congress, gold was the topic under study. The League of Nations called for the published proceedings for purposes of considering the potential

gold supply in respect to studies on currency by one of its committees.

By concentrating on special topics, world facts are assembled and made available. Resources can be appraised and industry can be informed, so that plans for the future in respect to competition and distribution may be worked out intelligently.

The American committee on organization has as its honorary president, Mr. Hoover. In addition to supplying the general secretary, Dr. W. C. Mendenhall, the Geological Survey is also represented by H. G. Ferguson and M. I. Goldman, who serve as assistant secretaries. Honorary vice-presidents of the committee include: The Secretary of State, the Secretary of the Interior, the director of the Geological Survey, the president of the Geological Society of America, the president of the American Association of Petroleum Geologists, the president of the American Institute of Mining and Metallurgical Engineers, and the president of the Academy of Sciences.

THE TWELFTH BIENNIAL CONCLAVE OF ALPHA CHI SIGMA

THE twelfth biennial conclave of Alpha Chi Sigma, professional chemical fraternity, was held from June 13 to 17 on the campus of the University of Maryland. Convention headquarters were at the Phi Delta Theta House, meetings were held in the auditorium of the chemistry building, the delegates housed in the university dormitories, and meals were served at the Lord Calvert Inn. The largest attendance in the history of the fraternity was recorded.

The conclave was featured by alternating half-day business sessions with half-day pleasure intervals such as trips to Mt. Vernon, Arlington, in and about Washington, Annapolis and the Bureau of Standards. One half day was devoted to sports and a model initiation was conducted by Alpha Rho, University of Maryland, one of the host chapters. A reception, a dance and a banquet were also included.

Election of national officers resulted as follows: Marion E. Dice, Los Angeles, national president; H. E. Wiedemann, St. Louis, senior vice-president; V. W. Meloche, University of Wisconsin, junior vice-president; W. S. Ritchie, University of Missouri, national ritualist; John R. Kuebler, Indianapolis, national secretary. Charles A. Mann, University of Minnesota, retiring national president, was presented a diamond bordered badge.

Conclave hosts were the Alpha Rho chapter, University of Maryland, Alpha Pi chapter, George Washington University, and the professional chapter in Washington.

W. L. Lamar was chairman and Norman Bekke-dahl secretary of the local Washington committee. Chairmen of the various committees were as follows: Hospitality, H. H. Kaveler; Finance, H. A. Jones; Registration, T. C. Davis; Transportation, N. Bekke-dahl; Dance, S. T. Schicktanz; Smoker, O. W. May; Sports, H. P. Newton; Initiation, R. L. Sawyer; Ladies Entertainment, C. A. White; Printing, Klare S. Markley; Publicity, R. M. Hann. National committee chairmen were as follows: State of the Order, John D. Ferry, Stanford; Finance, A. B. Weaver, Indiana University; Ways and Means, T. G. Rochow, Cornell University, and Credentials, E. S. Gruver, University of Maryland.

THE FIFTH GREENLAND EXPEDITION OF THE UNIVERSITY OF MICHIGAN

The Michigan Pan-American Airways Expedition, the fifth Greenland Expedition of the University of Michigan, sailed from New York on June 15 on the schooner *Morrissey*, Captain R. A. Bartlett, bound for Cape York in Northwest Greenland to erect a memorial column to Admiral Peary, discoverer of the North Pole. The *Morrissey* was to call at Brigus, Newfoundland, June 26, to take on board masons and also Dr. Ralph L. Belknap, the leader of the Michigan Expedition.

Besides the leader, the Michigan Expedition includes Evans S. Schmeling, second in command and aerologist; Max Demorest, assistant aerologist, and Herbert Gardner. Demorest, who was assistant aerologist of the fourth Greenland Expedition, is to join in September, going by way of Copenhagen. The base of the expedition is to be the neck of the Upper Nugs-suak peninsula in latitude 74° N. near where the Cornell Greenland Expedition under the late Professor R. S. Tarr made its base more than thirty years ago. Aerological work will be carried out throughout the period of the Second International Polar Year. Glaciological and geological work will also be included, and Dr. Belknap expects to make a dog-sled expedition to the middle of the ice-cap in the early

spring of 1933. He will also carry out certain studies for the Pan-American Airways. Dr. Belknap has been a member of three earlier Greenland expeditions, Mr. Schmeling of two, and Mr. Demorest of one; all expeditions from the University of Michigan.

AWARDS OF THE ROYAL GEOGRAPHICAL SOCIETY

The annual meeting of the Royal Geographical Society, London, was held on the afternoon of June 20, when the medals and awards for 1932 were presented. The King had approved the award of the Founder's Medal to Mr. H. G. Watkins for his work in the Arctic regions as leader of the British Arctic air route expedition, and of the Patron's Medal to H.R.H. the Duke of Spoleto for his work in the Himalaya as leader of the Karakoram Expedition in 1929.

According to the report in the *London Times*, Admiral Sir William Goodenough, who presided and made the presentations, said that the award to the Duke of Spoleto—who was unable to be present—was a recognition on the part of the society of the admirable work done by his Royal Highness when he led the Italian expedition in 1929 and also of his preliminary visit to Askole the year before, when he took up a large amount of stores and made the necessary reconnaissance which ensured success. This expedition resulted, among other things, in joining up with the route of Sir Francis Younghusband's in the Shaksgam Valley and later tracing that valley above the Urdok Glacier. It was agreeable that the long association of the society with the Royal House of Savoy should be continued in a younger generation.

To Mr. Watkins, Admiral Goodenough said: "His Majesty has approved of the Founder's Medal being awarded to you for your work of investigation, exploration, and research in the Arctic, culminating in the British Arctic air route expedition of 1930-31. I believe that you are the youngest man who has ever received a Royal Medal of this society. You have placed yourself in the front rank of Arctic explorers. We wish you well in the minor expedition that you are going to lead in Greenland, and we hope that in the future you will be enabled to carry out that great project in the Antarctic which I know fills your mind." The other awards made included the Victoria medal to Professor A. P. Coleman, of Toronto, for his contributions to the geography and geology of Canada; the Murchison Grant to Dr. K. S. Sandford, secretary of the commission of the International Geological Union on Pliocene and Pleistocene Terraces, for his personal work in that investigation during the past six years; the Back Grant to Mr. Hugh

Clutterbuck for his expedition to Akpatok Island; the Cuthbert Peek Grant to Miss Gerturde Caton-Thompson for her investigations in the historical geography of Lake Moeris, and the Gill Memorial to Dr. E. B. Worthington for his studies of East African Lakes.

APPOINTMENTS AND PROMOTIONS AT THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH

THE Board of Scientific Directors of the Rockefeller Institute for Medical Research announces the following appointments and promotions on the Scientific Staff to take effect on or after July 1, 1932:

New appointments:

<i>Associate Member</i>	Dr. Francis O. Holmes
<i>Associates</i>	Dr. A. Garrard Macleod
	Dr. Herbert T. Osborn
<i>Assistants</i>	Dr. Joseph W. Beard
	Dr. William F. Bruce
	Dr. Merrill W. Chase
	Dr. Harold R. Cox
	Dr. George L. Fite
	Mr. Roger M. Herriott
	Mr. Samuel E. Kamerling
	Mr. Malcolm H. Merrill
	Dr. Johannes K. Moen
	Mr. William C. Price
	Dr. Edward S. Rogers
	Dr. Jerome T. Syverton

<i>Fellows</i>	Dr. Anton Schormueller
	Mr. Ernest L. Spencer
	Dr. Erich Traub
	Dr. Philip R. White

Promotions:

<i>Assistant to Associate</i>	Dr. Albert E. Casey
	Dr. Robert C. Elderfield
<i>Fellow to Assistant</i>	Mr. James H. Jensen

Members of the staff of the institute have accepted appointments as follows:

Dr. George P. Berry, professor of bacteriology and head of the department, and as associate professor of medicine at the Rochester Medical School, New York.

Dr. Philip Levine, instructor of pathology and bacteriology at the University of Wisconsin, Madison.

Dr. Currier McEwen, assistant dean of the New York University Medical School.

Dr. Harold J. Stewart, associate professor of medicine, Cornell University Medical College, and attending physician at the New York Hospital.

Dr. J. Lionel Alloway, assistant professor of bacteriology, department of bacteriology, Cornell University Medical College.

Dr. Maedonald Dick, instructor in medicine, Duke University.

Dr. Filip C. Forsbeck, research epidemiologist to the State of Michigan, Lansing.

Dr. Ralph E. Knutti, resident pathologist at the Strong Memorial Hospital, Rochester, New York.

Dr. Douglas H. Sprunt, assistant professor of pathology at the Medical School, Duke University.

SCIENTIFIC NOTES AND NEWS

FOREIGN members elected to the Royal Society of London are Dr. Theobald Smith, Princeton, comparative pathology; Dr. Graham Lusk, New York, physiology; Professor Jacques Salomon Hadamard, Paris, mathematics, and Dr. Walther Nernst, Berlin, physics.

DR. ALBERT EINSTEIN has been elected a corresponding member of the Academy of Sciences at Lisbon.

M. LE DUC DE BROGLIE, the French physicist, has been elected an honorary member of the Cambridge Philosophical Society.

ELECTIONS as correspondents of the Paris Academy of Sciences include M. Paul Stroobant, in the section of astronomy; M. Henry Buisson, in the section of general physics to succeed the late M. R. Blondlot, and M. H. Perrier de la Bathie in the section of botany.

AT the recent commencement of Western Reserve University, the honorary degree of doctor of laws was conferred on Dr. Lafayette B. Mendel, Sterling professor of physiological chemistry in Yale University.

THE degree of doctor of science was conferred at the one hundred and sixty-fourth commencement of Brown University on Charles Franklin Kettering, vice-president of the General Motors Corporation.

DR. ROSCOE W. THATCHER, retiring president of the Massachusetts State College, received the degree of doctor of laws at the commencement of Amherst College.

AT the commencement of Denison University, Ohio, its honorary doctorate of science was conferred on Dr. Douglas Johnson, professor of physiography at Columbia University.

AT the recent commencement exercises at Lehigh University the honorary degree of doctor of science was conferred on Mr. Henry A. Gardner, director of the Institute of Paint and Varnish Research of Washington, an authority on protective coatings; and on Edwin Fitch Northrup, vice-president of the Ajax Electrothermic Corporation, of Princeton, New Jersey, who has contributed to electrical and metallurgical science through his development of electrical instruments, electrical pyrometers and induction furnaces.

ON June thirteenth at its eighty-second annual commencement, Lawrence College at Appleton, Wisconsin, conferred the honorary degree of doctor of science on Professor R. A. Gortner, of the University of Minnesota. President Henry M. Wriston in his citation said: "You have never been content to follow the beaten paths; the blood of the pioneers and the missionaries has made the frontiers of knowledge seem most attractive. During the twenty-five years since your graduation from college, the fertility and vigor of your mind have resulted in distinguished contributions in biochemistry and colloid chemistry."

DR. ROLLA EUGENE DYER, of the United States Public Health Service, received on June 20 the honorary degree of doctor of laws from Kenyon College, in recognition of work "in discovering the mode of transmission of endemic typhus fever in the United States and the differentiation of typhus fever and the eastern type of Rocky Mountain spotted fever."

PRESENTATION of a portrait of Dr. Robert R. Bensley was made to the University of Chicago on June 14, when a group of Dr. Bensley's students and colleagues gathered at a dinner given in his honor. Dr. Bensley is professor of anatomy in the Division of Biological Sciences at the university and has been a member of the department since 1901. The speakers included Dr. G. Carl Huber, professor of anatomy, University of Michigan Medical School; Dr. Julius Stieglitz, chairman of the department of chemistry, and Dr. C. Judson Herrick, professor of neurology.

THE American Society of Plant Physiologists has elected the following officers: *President*, Professor Dennis R. Hoagland, professor of plant nutrition, University of California; *Vice-president*, Dr. C. O. Appleman, professor of plant physiology and biochemistry and dean of the Graduate School of the University of Maryland, and *Secretary-treasurer*, Dr. Wright A. Gardner, professor of botany and plant physiology at the Alabama Polytechnic Institute.

AT the recent annual meeting of the American Malacological Union held in Washington, Dr. Paul Bartsch, of the National Museum, was elected to the presidency of the union.

DR. DONALD G. PATERSON, professor of psychology at the University of Minnesota, was elected president of Sigma Xi, at the recent annual meeting of the Minnesota Chapter. Dr. George O. Burr, of the department of botany, became vice-president; Dr. Frederick B. Hutt, professor of animal genetics, secretary, and Drs. Charles A. Mann and Own Wangensteen, directors.

DR. THOMAS R. GARTH, professor of educational psychology at the University of Denver, has been

elected president of the Colorado branch of the American Psychological Association.

DR. WILLIS D. GATCH, professor of surgery in the Indiana University School of Medicine, Indianapolis, since 1911, has been appointed dean of the school to succeed Dr. Charles P. Emerson. Dr. Gatch has been acting dean of the school since Dr. Emerson's departure last fall to engage in the inspection of missions in the Far East on behalf of the Rockefeller Foundation.

DR. WEBSTER N. JONES, general superintendent of the processing division of the B. F. Goodrich Company, Akron, Ohio, has been appointed director of the College of Engineering at the Carnegie Institute of Technology, Pittsburgh, to succeed Professor William E. Mott, who recently resigned after twenty-two years' service.

THE appointment of Dr. Hiram S. Lukens, professor of chemistry, to the directorship of the John Harrison Laboratory of Chemistry, is announced by the University of Pennsylvania.

DR. HUBERT B. VICKERY, lecturer on the chemistry of proteins at Yale University, has been promoted to an associate professorship.

PROFESSOR H. V. A. BRISCOE, since 1921 professor of inorganic and physical chemistry at Armstrong College, Newcastle-on-Tyne, has been appointed to the chair of inorganic chemistry at the Royal College of Science, London.

DR. HANS STILLE, professor of geology and paleontology at the University of Göttingen, has been called to Berlin.

COLONEL EDWARD B. VEDDER, who has recently completed his tour of duty as director of the Army Medical School, Washington, and director of laboratories, Army Medical Center, was transferred on June 1 to the Medical Research Laboratories of the Chemical Warfare Service, Edgewood Arsenal. Colonel Philip W. Huntington is now in command of the Army Medical School and Major James Stevens Simmons has been appointed director of the department of laboratories.

ON June 17, Dr. P. E. Raymond, Dr. M. P. Billings and Mr. A. B. Cleaves, of the geological staff of Harvard University, joined Dr. Bradford Willard, of the Pennsylvania Topographic and Geologic Survey, for a field conference. Eight days were devoted to studies of the Ordovician-Silurian relations and of the Silurian and Devonian stratigraphy of eastern Pennsylvania.

FRANK B. MALLORY, professor of pathology at the Harvard Medical School, delivered the Shattuck

lecture at the one hundred fifty-first annual meeting of the Massachusetts Medical Society, held in Boston.

IN connection with the formal opening of the new Botany Building and plant houses of the University of Toronto, on June 8, Professor A. C. Seward, head of the Botany School of the University of Cambridge and master of Downing College, gave a lecture on "Plant Life through the Ages."

PROFESSOR H. E. ARMSTRONG will deliver the next Huxley Memorial Lecture at the Imperial College of Science and Technology on May 4, 1933. Professor Armstrong will speak on Huxley's educational work.

THE Faraday Lecture of the Chemical Society of London will be delivered on March 29, 1933, by Professor P. Debye, of Leipzig.

Nature reports that Sir Frederick Gowland Hopkins opened a discussion on "Recent Advances in the Study of Enzymes and their Action" held at the Royal Society on June 16. Other speakers included Professor R. Willstätter, of Munich; Professor Waldschmidt-Leitz, of Prague; Dr. Richard Kuhn, of Heidelberg; Professor A. Harden, Professor J. B. S. Haldane, Dr. D. Keilin and Dr. J. H. Quastel.

AT a meeting of the Mayo Foundation Chapter of Sigma Xi on June 13, Dr. E. S. Judd gave an address on "The Early History of Organized Medicine." At this meeting, Dr. L. B. Wilson, the national president of Sigma Xi, inducted sixteen members into the society.

A MESSAGE to *The New York Times*, dated June 30, states that while Professor Othenio Abel, professor of paleontology and newly appointed rector of the University of Vienna, was delivering a panegyric at the unveiling of a monument to the Austrian botanist Richard Wettstein in the Vienna Central Cemetery on June 30, a shot was fired at him, the bullet passing over his shoulder. Dr. Karl Camillo Schneider, associate professor of zoology, called "a personal and professional enemy" of Professor Abel, is said to have made the attack. Professor Abel finished his speech after the police had arrested the assailant.

ACCORDING to *The British Medical Journal* the forty-third Congress of the Royal Sanitary Institute, which will be held at Brighton from July 9 to 16, will be addressed by Professor C.-E. A. Winslow, of Yale University, on the subject of current tendencies in American public health. Seven sections have been organized for discussions—namely, preventive medicine; architecture, town planning, and engineering; maternity and child welfare, and school hygiene; food and nutrition; hygiene and industry; veterinary hygiene, and national health insurance. Conferences are being arranged for representatives of sanitary

authorities, medical officers of health, engineers and surveyors, sanitary inspectors, and health visitors. Among the topics to be dealt with are the work of local authorities relative to cancer, illumination and visual fatigue in industry, the advantages of houses with electrical adaptations for light and other purposes, mental hygiene, health conditions in underground offices, sea outfalls for sewage, and the municipal activities in Brighton. A large health exhibition in the Dome and Corn Exchange will be stocked with household and kitchen appliances, sewage disposal apparatus, refrigerators, disinfecting apparatus, drainage appliances, and infant and invalid foods.

A SCIENTIFIC reunion was held on June 15 in the Board Room of the British Museum (Natural History), South Kensington, by the director, Dr. C. Tate Regan, and the scientific staff. Newly acquired specimens and new discoveries were shown from various departments, the principal display being given to a meteorite collection based upon Mr. H. St. John Philby's discoveries in the Arabian desert. With Mr. Philby's map of the supposed ruined city (really a series of meteoric craters) there were shown gifts from him to the museum.

The British Medical Journal writes: "The Harveian Society of London's annual dinner, given by Sir George Buckston Browne, was held on the evening of June 9, with the president, Mr. Cecil P. G. Wakeley, in the chair. The company included the medical heads of the three fighting services, the Presidents of the Royal Society of Medicine, the Medical Society of London, and other kindred professional bodies, the Harveian lecturer (Sir Percy Sargent), and the president of the British College of Obstetricians and Gynecologists. After the loyal toasts had been honored, Lord Riddell, president of the Medico-Legal Society, proposed the health of the Harveian Society, and as he recounted a series of amusing anecdotes it gradually became clear that Lord Riddell was offering a silver-gilt loving cup to the society with Harvey's name on one side and Sir George Buckston Browne's on the other. Mr. Wakeley, replying to the toast, made an appreciative reference to the knighthood bestowed on Sir George Buckston Browne, who, he said, was the grand old man of the society."

A SCIENTIFIC institute has recently been established in Moscow to carry on research on the circumstances of formation of cloud, fog and rainfall. The institute has branches in Leningrad, Odessa, Saratov, Tashkent, and Askhabad. The Leningrad branch of the institute is installing apparatus for investigating the effect on the atmosphere of high-tension currents, X-ray, ultraviolet rays and radioactive radiations. It is hoped to test the apparatus next summer in experiments to be carried out in the drought regions of the U.S.S.R.

THE Minnesota State Executive Council has voted an additional \$150,000 emergency appropriation for the campaign against grasshoppers. A. G. Ruggles, state entomologist, reports them threatening destruction of the crops in 46 of the 87 counties of the state. At the same time, the Minnesota Railroad and Warehouse Commission announced that four railroads serving the infested areas had agreed to a reduction on freight rates for poison bran from the Twin Cities mixing points, to about half the regular rates. The lines are the Soo, Great Northern, Northern Pacific, and Milwaukee. This is the third appropriation for the grasshopper campaign, and brings the total appropriated to \$250,000.

ON June 18 the Governments of Canada and the United States joined in dedicating the Waterton-Glacier International Peace Park to public use. The peace park was created by proclamation of President Hoover, as authorized by the Congress of the United States and the Canadian Parliament. Its purpose is to commemorate the long-existing relationship of peace and good will existing between the people and the governments of the two countries. For purposes of administration the component parts of the peace park, the Waterton Lakes Park of Canada and the Glacier National Park in the United States, each will retain its nationality and individuality; but together they will form one great international park that is unique in history. The following message from President Hoover was read at the dedicating exercises: "The dedication of the Waterton-Glacier International Peace Park is a further gesture of the good will that has so long blessed our relations with our Canadian neighbors, and I am gratified by the hope and the faith that it will forever be an appropriate symbol of permanent peace and friendship."

THE New York conservation commissioner, Henry Morgenthau, Jr., reports that since January 1 land

acquisitions under the enlarged reforestation program have already exceeded the entire quota for 1932. A total of 50,253.03 acres has been placed under contract. Although the year's quota is 50,000 acres, purchases will not be discontinued but will go on during the remainder of the year, as the funds available for this purpose have not nearly been exhausted. Lands acquired this year are in 45 areas and have been purchased from 255 different owners. Of the total, 17,063.61 acres are within the Forest Preserve Counties but outside the Forest Preserve proper. Including purchases made in previous years, the total acreage acquired and under contract for reforestation to date is 131,597.37 acres, in 134 areas in 26 counties. This spring the Conservation Department planted more than 22,000,000 trees on 27,000 acres of this land, giving employment to more than 10,000 men, furnished by local unemployment relief agencies.

Nature writes: "Many specialists on the systematics of the Vertebrata are under the mistaken impression that the famous collection made in the course of the nineteenth century by Michel Edmond de Sélys-Longchamps is either destroyed or lost. Happily this is not so. The collection was preserved in the Chateau de Longchamps près Waremme, Belgium, where it occupied the little museum which de Sélys built, but it was not readily accessible to specialists and was in the care of an old servitor. The fate of this collection, which is a veritable treasure-house for mammalogists and ornithologists, has just been settled in a way which will give widespread pleasure. Barons Maurice, Raymond, and Edmond de Sélys-Longchamps, grandsons of the great zoologist, have given the whole collection to the nation, and it is being placed in the Royal Museum of Natural History at Brussels. Thus all de Sélys' zoological collections are brought together again, for in 1900 de Sélys bequeathed his important entomological collection to the museum."

DISCUSSION

THE OUACHITA PROJECT

IN a lull between turns in the most riotous ante-election program that Congress has put on the national boards in many years, a small voice has become momentarily audible planning a domestic event for the quiet reaction of the season after. It suggests a memorial to an industrious member of the House whose passing last year concluded a continuous service of twenty years. It is proposed by his widow, who succeeded him in Congress and will herself retire on completion of her first term.

Readers of SCIENCE all over the country who opposed creation of the Ouachita National Park five

years ago and were rescued from defeat by President Coolidge's veto as his last official act, and opposed again in the following Congress when their own protests held the bill at the bottom of the calendar, will hardly recognize it in its new rôle as a tribute to public service. This communication is a warning in advance to look out for Ouachita at the opening of the short session next December. Members of Congress are notoriously partial to memorials. For this reason we have been advised by members of the House who opposed it before that this time the bill will be specially hard to defeat.

The Ouachita project, it will be recalled, proposes

turning part of an Arkansas National Forest into a national park. It was opposed by the Secretary of Agriculture and Forest Service as a dangerous precedent for local looting of the national forest; by the Secretary of the Interior and National Park Service as a fatal precedent for crowding the system with low-standard parks in the interest of local business; and by hundreds of public-spirited associations and thousands of individuals.

Those who favored the project frankly argued that local business needed motor tourists. Besides, four neighbor states needed another Arkansas national park because few of their people could visit the western national parks! As if calling it a national park would impart to it the gorgeous beauty of Yosemite! To these old arguments will be added attack on national park standards of quality "because they are not broad enough to cover State needs." Also, now, to serve as a memorial!

If the old bill to make the area a new national park seems doubtful of passage, another will be substituted to make it a separate "floating addition" to Hot Springs National Park, also in Arkansas. This, it is thought, might be easier to pass. Why, it is difficult to understand.

Meantime promoters of a score or two of other projects below national park standards of quality will keenly await the precedent.

ROBERT STERLING YARD
General Secretary,
National Parks Association

A NEW METEORITE FROM THE BLACK HILLS

THE South Dakota State School of Mines has recently added to its geological museum an iron meteorite found during the summer of 1931 on North Redwater Creek near the eastern base of Bear Lodge Mountains—a subordinate portion of the Black Hills—in Crook County, Wyoming. It was unearthed by a workman while repairing the highway leading westward from the postoffice of Farrall, the site of the find being approximately twelve miles northeast of Sundance, the county seat of Crook County. There is no information available as to the time of its fall.

The meteorite, designated as the Bear Lodge meteorite, is a rough, compact, angular mass fourteen inches long, ten inches wide and six and one half inches high in the highest part, measured perpendicular to the rather flat base. Its weight as found was one hundred seven pounds seven ounces. It is covered with a thin coat of reddish brown, dimly mottled oxide resembling ordinary iron rust. Much of the surface is coarsely pitted, the individual pits being irregular, more or less coalescing depressions an inch

or more in depth and from one to two or three or more inches in diameter. The flattened surface, designated as the base, is an irregular, somewhat rectangular area approximately twelve inches in longest direction and approximately eight inches wide. One corner of the specimen projected prominently, and this portion, removed from the main mass and weighing about three pounds, has received preliminary examination.

Analysis of unoxidized drillings shows iron to the amount of 91.70 per cent. and nickel 8.12 per cent. An etched surface discloses characteristic crystallographic figures and a number of fine thread-like cracks or fissures. The meteorite is being studied by Professor J. P. Connolly, of the department of Mineralogy and Petrography, and it is expected that at a later time a more detailed description will be given.

CLEOPHAS C. O'HARRA
SOUTH DAKOTA SCHOOL OF MINES

INFECTION OF THE CLOACA WITH THE VIRUS OF INFECTIOUS BRONCHITIS

A VIRUS disease, known as infectious bronchitis, is responsible for wide-spread losses in poultry flocks. The suggestion that the virus might also be made to attack the cloacal tissue without harmful results and with subsequent immunity presented itself. Accordingly, an infected cotton swab was introduced into the cloaca of a bird with the result that after three days an acute inflammation developed in the proctodeumal portion of this structure. Four days later a cotton swab infected from this bird was used to inoculate the cloaca of another, which in turn showed the same disease process. Thereafter the virus was carried through four more generations at intervals of three days.

Each of the birds infected in the cloaca also furnished material for inoculating another bird intratracheally. These birds showed the typical symptoms of the disease, and all but one of the five inoculated recovered.

The recovered birds were tested for immunity at the close of the experiment. Those previously attacked in the cloaca resisted tracheal inoculation and those recovered from tracheal inoculation resisted cloacal infection. At this time the inoculated birds had received their immunizing dose 11 to 27 days previously. Experiments making use of cloacal inoculation as a practical means of immunization are now under investigation.

C. B. HUDSON
F. R. BEAUDETTE
NEW JERSEY AGRICULTURAL EXPERIMENT
STATION,
NEW BRUNSWICK

ZOOLOGICAL NOMENCLATURE

IN accordance with prescribed routine, the undersigned invites the attention of zoologists to the fact that application has been made to the International Commission on Zoological Nomenclature to suspend the Rules and to place in the Official List of Generic Names—

Lepidocyclina Gümbel, 1868, type (1898) *Nummulites mantelli*; objective synonym *Cyclosiphon* Ehrenberg, 1856, type *N. mantelli*;

Lytoceras Suess, 1865, genotype *Ammonites fimbriatus* Sowerby; and

Ophiceras Griesbach, 1880, genotype, *O. tibeticum* Griesbach.

These cases will be held open until about July 1, 1933, to enable zoologists to submit to the commission their opinions, for or against the proposition.

C. W. STILES,
Secretary

SCIENTIFIC BOOKS

Elements of Geophysics as Applied to Explorations for Minerals, Oil and Gas. By DR. RICHARD AMBRONN, Göttingen. Translated by Margaret C. Cobb, Ph.D., New York, McGraw-Hill Book Co.

THIS book is a translation of Ambronn's "Methoden der angewandten Geophysik," published at Dresden and Leipzig in 1926. The attentive reader of either the original or of the translation will learn much about the many branches of geophysics, both of their scientific foundations and of their commercial applications, for, as appears from the title, the latter phase of the subject is the main subject of the book; the foundations are treated only because they are a necessary preliminary. They are, however, adequately treated.

The reader of this book must not expect, however, that a study of it, however careful, even when accompanied by a further study of the numerous books and articles to which reference is made in the text, will put the reader in a position successfully to undertake prospecting for oil, gas or minerals. The author expressly disclaims any such purpose or power. The reasons are not far to seek. Geophysical prospecting, though based on a scientific foundation, is to some extent an art and can not be learned wholly from books but needs practice or personal contact with a teacher, or both. Furthermore, since geophysical prospecting is pursued primarily for profit, the methods used and results obtained are seldom published in detail. This is a loss to science, for the same methods that yield results of commercial value might be expected to yield also results of scientific value, and the "pure" scientist may not unnaturally be envious of the large sums devoted to commercial work in comparison with the meager pittances doled out to research for its own sake.

These ideas, however, lead us a little aside from the book under review. The author's name and position is a guarantee that the facts are competently presented. (He is one of the editors of the *Ergänzungshefte für angewandten Geophysik*, published in connection with *Gelands Beiträge zur Geophysik*, and the manager of a concern engaged in commercial prospecting.

However, several slips detected by the reviewer in fields with which he happens to be familiar illustrate the practical impossibility of being infallible over the wide range of subjects embraced under the general heading of geophysics. For instance, in Chapter II the numerical values given as those of $\frac{\partial g}{\partial z}$ (g = acceleration of gravity, z = distance along the vertical) are really values of $\frac{1}{g} \frac{\partial g}{\partial z}$, except for an error in the position of the decimal point due to a slip in reproducing the figures in Messerschmitt's work, from which the figures were taken and in which the decimal point is correctly placed and the quantity correctly designated, though not with all the clearness that might be desired. In one instance Messerschmitt's 0.000 000 196 is changed to 0.000 00 296, apparently to agree better with the other figures in the table. Nevertheless 1 and not 2 is the correct figure for the quantity intended and the slip in regard to the decimal point has just been noted. Incidentally recurved $d(\cdot)$ for partial derivatives is not used anywhere, so that the formulas containing partial derivatives look as if they might have appeared in an English work of a hundred years ago.

In Chapter II also there is some confusion between the elevation of the geoid above the spheroid and the errors introduced by anomalies in gravity into the elevations above sea-level deduced by spirit leveling. The former may be fairly considerable, perhaps some tens of meters, the latter only a fraction of a meter. In Chapter III the vessel of the Carnegie Institution of Washington that preceded the non-magnetic *Carnegie* is called the *Galileo*. This is a very appropriate name for a vessel engaged in scientific work, but as a matter of fact she was named the *Galilee*. These instances of error of varying degrees of importance may serve to put the reader on his guard against placing a too implicit faith in the literal exactness of every statement made.

The bibliographical references are abundant and constitute one of the most useful features of the

book, but to use them the key to the abbreviations must be consulted, since the names of scientific journals are so much abbreviated that it is impossible to guess even the names of the best known among them.

So far, what has been said applies both to the original German and to the English translation. In the latter the language of the original preface and introduction has been condensed somewhat, but elsewhere the chief changes in substance seem to be additions, mostly a line or two here and there of additional statement, with perhaps additional bibliographical references. In some instances, however, whole paragraphs or pages have been added in order more fully to develop the subject or to bring it down to date.

Dr. Cobb has used the translator's privilege to break up many of the long periodic sentences so characteristic of German style into shorter ones more agreeable to English-speaking readers, but the translation still reads like a translation. In many passages the language is not smooth and in some the author's thought is incorrectly rendered. However, for English-speaking readers the translation will be easier to follow than the original and, of course, more nearly abreast of recent developments. It may occasionally be convenient, however, to have the original at hand to refer to.

WALTER D. LAMBERT
U. S. COAST AND GEODETIC SURVEY

SCIENTIFIC APPARATUS AND LABORATORY METHODS

CORRUGATED RUBBER TAMBOUR DIAPHRAGMS

SINCE its invention and description by Marey the tambour has consistently held its place as one of the most widely used and one of the most serviceable devices for exploring behavior. Since the careful analysis of Frank its limitations are well understood. Certain errors due to transmission by an elastic medium are inherent in the system. Errors due to the mass and unfavorable leverage of the recording arm can be reduced in many instances to a negligible minimum but not without some sacrifice of sensitivity. Of the several suggestions for obviating the errors dependent on rubber diaphragms no one has proved satisfactory enough for wide acceptance. For experimental purposes we needed a diaphragm of greater permanence, increased sensitivity and closer proportionality between excursion and air pressure throughout the range of deformation. After trying several materials, including corrugated collodion and cellophane, we have to report a reasonably satisfactory corrugated rubber membrane. As finally made by Mr. Newton this compares favorably with the flat rubber diaphragms with respect to all three desiderata. Their durability is still under test, but the latex preparation that we use is reported by the makers to be very durable. The corrugated membrane tested over four and a half times as sensitive to air pressure as a fresh Harvard Apparatus Company diaphragm under usual tension. A pressure of 5 mm of Hg at a recording leverage of 4:1 gave average excursion amplitudes of 59.9 mm and 12.8 mm, respectively, for the corrugated and flat membranes. A cumulative step-wise series of air displacements of approximately .25 cc each gave the following amplitude steps:

Corrugated	Flat
2.52	2.10

2.49	2.03
2.38	2.02
2.50	1.95
2.59	1.89
2.90	1.85
2.62	1.75
2.83	1.65
2.72	1.68
2.90	1.57
Total	26.45 mm
	18.49 mm

Under both tests the corrugated membrane is the more sensitive. In the air displacement test both show changes in amplitude with increasing deformation of the membrane: the flat membrane becoming less sensitive, the corrugated becoming more sensitive, but changing less proportionately than the flat.

Obviously, the corrugated membrane is still in a state of development and must be carefully made to be satisfactory. A few membranes can, however, be supplied at low cost for experimental work. If Harvard tambours are sent to Mr. Newton available membranes will be mounted.

They can be furnished in three grades; average sensitivity, approximately like that on which the tests were made, extremely sensitive, and robust with more rapid recovery. A photographic record of the constants of each membrane in response to a pressure of 5 mm Hg can be furnished on request at cost of time and materials.

RAYMOND DODGE
F. H. J. NEWTON

YALE UNIVERSITY

A METHOD FOR THE DETERMINATION OF THE VELOCITY OF SOUND IN SOLIDS

RECENT developments in vacuum tube oscillators have made the velocity of sound in liquids far more accessible without adding materially to its significance

as property of matter. The velocity of sound in crystalline solids remains, however, almost as remote as before, although in this field a fundamental interpretation is at least possible. Any device for measuring this quantity should, therefore, be made known.

The accompanying sketch illustrates an apparatus for the purpose which seems capable of development to the necessary precision. A brass tube with entrance A and exit B, through which a gentle stream of thermostated liquid is maintained, is fitted with a multiple-junction thermoelement CC'. The compound junction C is wound with celluloid cement and silk to cause it to absorb sound. A plane-parallel faced sample of the substance under investigation may be inserted at D and secured by the screw-cap E, or at D there may be placed a very thin membrane of cellophane, and the solid under investigation interposed in the path of the impinging sound.

The principle of the apparatus depends upon the work of Boyle and Rawlinson,¹ who have shown that a train of plane sound waves traveling with a velocity v in an infinite homogeneous medium of density ρ will be reflected, when incident normally upon an infinite

parallel-faced partition of thickness l and density ρ , according to the relation

$$R = \frac{\left(\frac{v\rho}{v_1\rho_1} - \frac{v_1\rho_1}{v\rho} \right)^2}{4 \cot^2 2\pi \frac{l}{\lambda_1} + \left(\frac{v\rho}{v_1\rho_1} + \frac{v_1\rho_1}{v\rho} \right)^2}$$

where v_1 and λ_1 represent the velocity and wave-length of sound in the reflecting medium and R is the ratio of reflected to incident intensity. Boyle and Froman² have demonstrated the experimental validity of this expression for ultrasonic waves in media of finite extension. Since this function becomes zero for integral values of $2l/\lambda_1$ it is apparent that the absorption of sound by the thermoelement, and consequently the convergence temperature of thermostated liquid and thermoelement, will vary periodically with the thickness of the interposed solid layer.

The apparatus has been tested roughly in this laboratory, and found capable of operation with sound intensities of less than 0.01 watt per cm.² It has the advantage that, apart from the frequency measurement, it needs no more precise apparatus than an ordinary micrometer. Its chief disadvantage is that it requires a plane wave-source.

This note is submitted in the hope that it may catch the eye of some investigator with time and inclination to develop the method. In its present form it can lay claim neither to originality nor to completeness.

WILLIAM T. RICHARDS

ALFRED LEE LOOMIS LABORATORY,
TUXEDO, N. Y.

SPECIAL ARTICLES

SEXUAL VARIATIONS IN THE PELVIS¹

INTERPRETATION AND PRACTICAL SIGNIFICANCE

In this preliminary report we wish to show that male stigmata in the female pelvis tend to limit pelvic capacity; that the changed architecture resultant on the presence of these features can be appreciated by x-ray examination of the pelvis; that such knowledge is of considerable practical prognostic value to the obstetrician.

Studies in habitus and constitution are tending to isolate characteristic groups which indicate a predisposition to develop certain pathological states. During recent years such workers as Greenhill,² Cornell,³

Davis,⁴ De Lee⁵ and Solomons⁶ have stressed the obstetrical significance of these constitutional abnormalities. Of particular interest to the obstetrician is the so-called masculine type. These women frequently present a masculine physical make-up. They are rather prone to menstrual irregularities, late marriage, sterility, obesity and toxemias of pregnancy. Realizing the importance of the overlap of the sexual characteristics in the female, we have made an investigation on the form of the pelvis and on pelvic capacity

¹ *Can. Jour. Research*, 1: 405, 1929.

² E. L. Cornell, "The Conduct of Labor in the Dystocia Dystrophia Syndrome Patient," *Surg. Gynec. and Obst.*, pp. 707-710, November, 1931.

³ A. B. Davis, "Extra Peritoneal Caesarean Section in Presumably Infected and Mismanaged Cases of Prolonged Labor," *Amer. Jour. Obst. and Gynec.*, Vol. 7, pp. 373-383, April, 1924.

⁴ J. B. De Lee, "Principles of Obstetrics," 1928.

⁵ Bethel Solomons and Wentworth A. Taylor, "The Diagnosis of Disproportion Antenatal and Intranatal with a View to Treatment," *Jour. Obst. and Gynec.*, Brit. Emp., Vol. 36: 293-324, 1929.

¹ *Trans. Roy. Soc. Can.*, 22: 55, 1928.

² From the Department of Obstetrics and Gynecology, Columbia University and the Sloane Hospital for Women, New York City.

³ J. P. Greenhill, "The Dystocia Dystrophia Syndrome as an Indication for Caesarean Section," *Surg. Clin. N. Amer.*, p. 811, June, 1924.

in relation to the ease or difficulty of labor in this type of individual.

The characteristics of the average male and female pelvis are quite well known (Figs. 1 and 2). Anato-

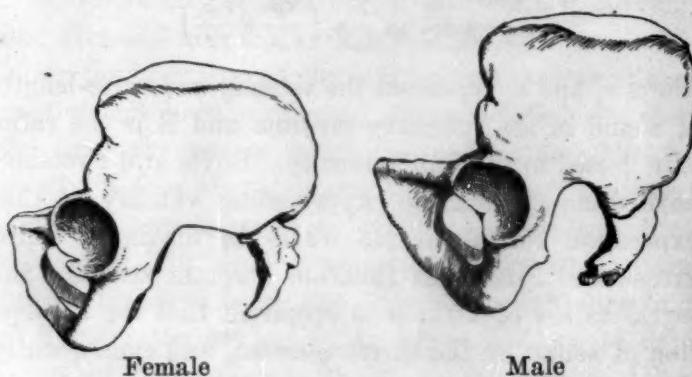


FIG. 1. Lateral view of adult female and male pelvis. Note contrast in size and shape of the sacrosciatic notch and relative position of sacrum. In the male note that the ilium forms the upper third of the posterior boundary of the sacrosciatic notch.

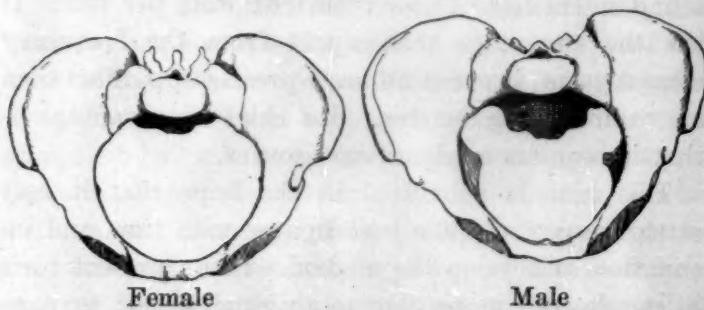


FIG. 2. View through inlet of adult female and male pelvis. Note the position of the lower lateral border of the sacrum in relation to the ischial spines, in the male pelvis.

mists and anthropologists have studied their characteristic sexual features and have long appreciated their practical importance in sexing unknown skeletal material. Such workers as Thomson,⁷ Derry,⁸ Hart,⁹ Wood Jones and Elliot Smith¹⁰ have carefully described these features and at the same time have stressed the frequency of the overlap of these characters. Straus¹¹ in 1927 very completely summarized

⁷ Arthur Thomson, "Sexual Differences of the Foetal Pelvis," *Jour. Anat. and Physiol.*, Vol. 33, pp. 359-380, 1898-99.

⁸ Douglas E. Derry, "Note on the Innominate Bone as a Factor in the Determination of Sex; with Special Reference to the Sulus Praeauricularis," *Jour. Anat. and Physiol.*, Vol. 43, pp. 266-276, 1908-1909. *Idem*, "On the Sexual and Racial Characters of the Human Ilium," *Jour. Anat.*, Vol. 58, pp. 71-83, 1923.

⁹ D. Berry Hart, "On Inversion of the Ilium and Sacrum and Ischium and Pubes (Ilio-Sacral and Ischio-Pubic Bony Segments) as Causes of Deformities of the Female Pelvis," *Edin. Med. Jour.*, Vol. 16, pp. 9-32, 1916.

¹⁰ G. Elliot Smith and F. Wood Jones, "The Archaeological Survey of Nubia," Report for 1907-1908. Vol. 2, 1910.

¹¹ W. L. Straus, "The Human Ilium; Sex and Stock," *Amer. Jour. Phys. Anthropology*, Vol. 11, p. 1, 1927-28.

the various opinions and evaluated the several sexual characteristics hitherto discussed. He states, "All of the characters studied, . . . vary so greatly and exhibit such marked sexual and stock-linked overlapping that they are of limited value in sexing . . . pelvis."

LIMITATION OF PELVIC CAPACITY

Due to the kindly cooperation of the curator of the American Museum of Natural History we were permitted to study their valuable collection of pelvises. Following careful inspection and study of the dried pelvises we were impressed by the sexual variations in the sacrosciatic notch and sub-pubic angles. On viewing a series of pelvises, male and female, through the pelvic inlet (Fig. 2) it will be noted that in the former the sacrum towards its lower half is projected forward, encroaching on pelvic capacity. Lateral inspection of the pelvises shows the apparent relationship of this feature to variations in size and shape of the sacrosciatic notch. That there may be a definite relationship between a narrow type of sacrosciatic notch and limitation of pelvic capacity as a result of the changed inclination of the sacrum seemed logical.

In order to establish a relationship, if it existed, we examined 70 specimens, 35 sexed as male and 35 as female. Internal measurements were limited to the true pelvis and were taken between similar bony points on each bone. The sacrosciatic notch and sub-pubic angle were measured in degrees by the camera lucida. Appreciating the personal error in measuring an irregular bony notch, the breadth of the notch at its widest diameter was carefully recorded. This measurement is practically identical with Thomson's distance from the junction of the posterior inferior iliac spine and external margin of the sacrum to the anterior margin of the great sacrosciatic notch. From measurements on eight adult female pelvises and five adult males, he noted a characteristic sexual difference in this diameter. For males the average was 40 mm, as contrasted with 49 mm for females. In our series these corresponding measurements averaged for males, 40.8 mm; for females, 53.9 mm. His results and ours thus practically correspond and indicate a definite sexual difference. Curiously enough, both for males and females the right sacrosciatic notch is smaller, but when expressed in averages of the two notches the difference is not great:

$$\begin{array}{ll} \text{Males—right} = 40.34 & \text{Females—right} = 53.31 \\ & \text{left} = 41.37 \quad \text{left} = 54.60 \end{array}$$

However, in our x-ray series stereographic pictures illustrate very definitely this point. The difference in the notches is slight, of course, but quite apparent. The results, without regard to sex, were submitted to

the Bureau of Statistics at Columbia University and correlations established between the sacrosciatic notch and the internal diameters of the true pelvis. Reference to the accompanying chart shows that the correlations are positive and significant.

TABLE OF CORRELATIONS BETWEEN DIAMETERS MEASURED AND BREADTH AND ANGLE OF SACROSCIATIC NOTCH

No. of pelves	Diameter measured	Breadth of notch	Angle of notch
70	Ant. post. of inlet	R = .3885	R = .3594
71	Trans. of inlet	R = .4894	R = .1352
68	Symphysis to tip of sacrum	R = .6808	R = .3799
68	Inter-tuberous	R = .7802	R = .5686
71	Sub-pubic angle	R = .5714	R = .4709
54	Sacrum to spine of ischium	R = .9186	R = .6923
68	Sacrum to tuberosity of ischium	R = .8726	R = .6879

Correlation between angle of notch and breadth of notch: R = .7527.

Average height of true pelvis: Male = 97.6; Female = 86.8.

The breadth of the notch appears to bear a higher relationship than the size of the notch expressed in degrees. This conflicting result can be attributed to the difficulty encountered in picking points from which to use a protractor and so express the true angle of the notch. As one would expect there is a very direct relationship between the diameters from the lateral border of the sacrum to the spine and to the tuberosity of the ischium. This clearly indicates that the inclination of the sacrum is dependent on the terminal portion of the ilium and that when the size and shape of the sacrosciatic notch varies, the sacrum likewise assumes a changed inclination. Both the intertuberous diameter and the sub-pubic angle, as one would expect, show a reasonably high correlation, particularly so when it is realized that one half of the pelvis measured were sexed as females with a wide typically female outlet. The antero-posterior diameter and transverse diameter of the brim show a lower but very definite relationship. Generally speaking, the results of the correlations lead us to conclude that, given a narrow sacrosciatic notch, all internal diameters of the true pelvis are decreased, incident to the degree of the correlation. This limitation of pelvic capacity is particularly prone to occur in the portion of the pelvis posterior

to the ischial spines. At the present time we are establishing correlations on a series of female pelvises and these results will undoubtedly correspond favorably.

PRACTICAL SIGNIFICANCE

In the living woman the sacrosciatic notch is bridged by the sacrospinous and sacro-tuberous ligaments. These ligaments arise from the ischial spine and tuberosity and spread, fanwise to their insertion along the lateral border of the sacrum and to the posterior inferior iliac spine. By rectal palpation the rounded free edge of the sacrospinous ligament can be felt, and with practice the distance between the ischial spine and lateral lower border of the sacrum can be appreciated. When the sacrosciatic notch assumes a narrow male form the sacrum moves forward in the pelvis, decreasing the length of the ligaments. Decrease in the length of the ligaments means, in labor, taut, unresistant tissue. In this event, the labor becomes proportionately more difficult, rotation may fail to occur, and the capacity of the roomy mid-pelvis is encroached upon. Thus, with the sacrum assuming a forward position in the pelvis, rotation of the foetal head becomes more difficult or occipito posterior positions more frequent with fixation of the head and arrest in this unfavorable position.

In our follow-up clinic we have submitted patients who have required operative interference to a roentgenological examination. Lateral x-ray exposures of the pelvis give a fairly accurate appreciation of the relative size and shape of the sacrosciatic notch. We find that in those individuals who had had difficulty in labor a high percentage showed a tendency to a male type of notch. (Fig. 3.)



FIG. 3. Reproduction to scale of x-ray films of masculine type of female pelvis. Medium forceps delivery. Note encroachment of sacrum on pelvic capacity and male type of sacrosciatic notch. The ilium forms part of the upper posterior boundary of the notch.

COMPENSATION

The following observations are based on interpretation of x-ray films from our follow-up clinic. In each case we were aided by a history of the obstetrical difficulty encountered and a knowledge of the form

of the sexual variations gained from a study of the dried pelvises mentioned above.

Derry⁸ in 1909 suggested that a wide sacrosciatic notch was of greater importance for easy labor than a wide sub-pubic angle. From our x-ray examination of the so-called funnel type this observation can be supported. Spontaneous delivery has occurred in cases of rather marked degrees of narrowing of the sub-pubic angle, but invariably in these cases the sacrosciatic notch was wide, associated with a long terminal ilium. Williams¹² has stressed the importance of the posterior sagittal diameter. This is, of course, an accurate index of the pelvic outlet, but the basic anatomical factor behind a wide or a narrow posterior sagittal diameter is high up in the pelvis, in the form and size of the sacrosciatic notch. The first obstetrical difficulty is then encountered in mid-pelvis. The exception to this rule occurs in an abnormal forward curvature of the lower end of the sacrum such as is met with in rickets. We have noted in several funnel pelvises delivered by Caesarean section a wide female type of notch. In view of the possibility of compensation we feel that in the future such cases might be allowed trial labor. On the other hand, with a combination of two male stigmata, such as a narrow sacrosciatic notch and a narrow sub-pubic angle, difficulty at time of labor can be expected. In this type of case elective Caesarean section can be sanely advised, as a reasonable method of delivery. The question of compensation does not appear to be entirely limited to the variations of the sacrosciatic notch and sub-pubic angles. It resolves itself into the appreciation of the fact that the pelvis is a very variable portion of the skeleton, and although in one region it may contain a stigma tending to limit its capacity, in others it is prone to attempt to compensate. Derry⁸ has shown that in the male the apex of the sacrosciatic notch is nearer to the auricular surface than in the female. Straus¹¹ admits this observation but considers it is only true on the average. He states, "Sometimes the notch is 'typically' female when the lower ilium is short (male) and in other instances the notch may be quite male in type when the lower ilium is long." In our x-ray series we have noted these points. Although the shape of the inlet is modified by the shape of the sacrosciatic notch and terminal ilium, usually the anterior portion of the pelvis compensates favorably. In one case the forward movement of the auricular surface toward the apex of the notch gave a decided heart-shaped appearance to the inlet with inward curvature of the ilio-pectineal line and projection forward of the sacral promontory. This resulted in the longest transverse diameter of the inlet being

¹² J. W. Williams, "Obstetrics," Sixth Edition, 1930.

situated nearer the sacral promontory than is commonly found in the typical female pelvis.

THE DEEP PELVIS

From measurements based on 35 male and 35 female pelvises we find a significant sexual difference in the depth of the true pelvis. The pelvic depth was taken as being the greatest perpendicular distance from the tuberosity of the ischium to the ilio-pectineal line. In males this averaged 97.6 mm, in females 86.8 mm. Thomson⁷ cites Verneau's measurements: for males 107 mm; for females 93 mm. In our x-ray series we find rather frequently women with thick masculine type of bones and increased depth to the true pelvis. An increase of 1 cm in the depth of the pelvis presupposes increased length of the pubic rami. In such a case the outlet or intertuberous diameter may be proportionately increased, the inherent size of the sub-pubic angle not necessarily being affected. In the event of an associated narrowing of the sub-pubic angle with increased length of the pubic rami, the outlet may present normal dimensions. This normal intertuberous measurement may thus obscure a dangerous type of funnel pelvis.

CONCLUSIONS

We feel that the size and shape of the sacrosciatic notch give an index of pelvic capacity and that variations therein may be indicative of male stigmata. X-ray examination of the pelvis gives an appreciation of these variations and also additional information concerning the form of the sub-pubic angle and a general conception of the bony architecture which may be of prognostic importance.

Detailed results of this investigation will be published later.

W. E. CALDWELL
H. C. MOLOY

BOOKS RECEIVED

- BENT, ARTHUR. *Life Histories of North American Galinaceous Birds*. Pp. xi + 490. 93 plates. U. S. National Museum, Bulletin 162. Smithsonian Institution. U. S. Government Printing Office. \$1.00.
- DENSMORE, FRANCES. *Menominee Music*. Pp. xxii + 230. Illustrated. Bureau of American Ethnology, Smithsonian Institution. U. S. Government Printing Office. \$8.00.
- FREUDENBERG, K. *Stereochemie*. Pp. 161-320. Illustrated. Franz Deuticke, Leipzig.
- GRISCOM, LUDLOW. *The Distribution of Bird-Life in Guatemala*. Pp. ix + 439. 11 figures. American Museum of Natural History.
- HELLMAYR, CHARLES E. *The Birds of Chile*. Volume XIX, Pp. 472. Field Museum of Natural History. \$2.50.
- KELLOGG, REMINGTON. *Mexican Tailless Amphibians in the United States National Museum*. Pp. iv + 224. 24 figures. Smithsonian Institution, U. S. Government Printing Office.
- SUTTON, GEORGE M. *The Birds of Southampton Island*. Pp. 275. 24 plates. Carnegie Institution.